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are applying our sulphur fertilizers at the wrong place in the rotation when we use them with the cereal grains which require little sulphur. Top dressing in legumes would be the logical time in the rotation to provide the sulphur when it is known to be deficient in amount.

While the results obtained by Reimer are certain not to be duplicated on certain types of soils in the eastern United States, as for instance on soils deficient in lime, or on acid soils, the results indicate that it is worth while to test out the value of sulphur generally through the country. The fact that the early users of gypsum over a century ago had similar results with soils in Pennsylvania and Virginia should encourage renewed experimentation with sulphur fertilizers, under conditions that preclude confusing one limiting factor with another. As already suggested, the early failures were probably caused by the soils being deficient in phosphorus rather than sulphur in some cases, or deficient in both at once, or at any rate not in sulphur alone.

We know enough now to make our tests crucial as to which element or elements limit production. The only way we can know the facts will be by actual tests. The system of soil fertility upon which our vast expenditure for fertilizers is based should be examined and tested with open unprejudiced minds. The tests of sulphur containing fertilizers should be made over wide areas in the eastern United States, for there must be many soils in which sulphur is deficient for optimum nutrition of high sulphur-requiring plants. In many cases where superphosphate has been used with success, it may be the sulphur, rather than the phosphorus that is the valuable element. In such cases substitution of the cheaper gypsum might yield as satisfactory results as the more expensive fertilizer.

American agriculture would be vastly benefited by extensive experimentation along the lines suggested, with strictly controlled conditions under which alone can we have a proper interpretation of results. With our expenditure for fertilizers much in excess of a hundred million dollars annually, it is highly im-

portant that our fertilizer practise should be put upon a rational basis at the earliest possible moment.

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### ERIC DOOLITTLE

ERIC DOOLITTLE, Flower professor of astronomy and director of the Flower Astronomical Observatory died September 21, 1920. In 1917 he was called upon to organize and conduct the U. S. Shipping Board Navigation School at Philadelphia. In attempting to teach the large number of men suddenly thrust upon him and to attend to the correspondence, registration and other necessary details without assistance, none being provided or immediately available, he greatly overtaxed his strength and collapsed under a slight stroke. Although later he was able to resume his university duties, he never fully recovered and did but little observing thereafter. In May, 1920, he became ill again. When his condition became serious he was removed to the University Hospital on June 24, at which place he died.

Professor Doolittle was born in Indiana in 1870. In 1876 his father, C. L. Doolittle, became professor of mathematics and astronomy at Lehigh University. The son graduated there as a civil engineer. After practising this profession for a year he was instructor in mathematics at Lehigh for a year and at the University of Iowa for two years. After spending a year in graduate work in astronomy at the University of Chicago, he became instructor in astronomy at the University of Pennsylvania in 1896, where his father has been called in the meantime as professor of astronomy.

The Flower Observatory was established in 1896. Eric Doolittle was placed in charge of the new 18-inch refractor with its superb Brashear lens. The telescope was made with a long focus, 30 feet, for double star observation. He immediately began his observations of double stars. He used the telescope almost

always when the stars were visible early or late. By day he had classes to meet in class rooms five miles away. For one evening each week the telescope was devoted to visitors. During cloudy weather, between classes and at other odd times he was busy in applying the new method developed by G. W. Hill, for the computation of the secular perturbations of the planets. No constitution could stand this terrific pace. His premature death was the result.

Professor Doolittle's fame rests chiefly upon his observations and discussions of double stars. The publications of the Flower Observatory contain measures of 3,920 double and multiple stars made by him together with the remeasurement of 648 double stars discovered by Hough. Another series of observations is ready for publication. Many discussions of double stars and other subjects are found in the astronomical journals.

In 1913 S. W. Burnham, who had long been recognized as the world's authority upon double stars, feeling that his age no longer permitted him to attend properly to the duties he formerly performed turned over his manuscripts and his library on double stars, a practically complete and priceless collection, to Professor Doolittle, thus placing the mantle of the world's foremost double star astronomer upon him. Burnham's great work "General Catalogue of Double Stars" appeared in 1906. Professor Doolittle has been most faithful to his trust, for in the safe at the Flower Observatory there is a large card catalogue known as the extension of Burnham's General Catalogue. On these cards are found the observations, discoveries and other information relating to double stars which has accumulated since the publication of the General Catalogue. This information is available to those interested. The work will of course go on and be published at some future time.

The results of his computations of secular perturbations were published as the parts were completed in *The Astronomical Journal*. When all the work was done the results were combined and discussed in "The Secular Perturbations of the four Inner Planets" pub-

lished by the American Philosophical Society, of which he was a member, in 1912. These results were obtained with most painstaking care and are not likely to be superseded for a long time.

He helped to popularize astronomy by editing and himself writing a large part of Vol. IV. of the "Foundation Library" entitled "The Wonderful Universe" and another work which has not yet appeared. He was widely known as the author of a series of popular monthly articles on current astronomical events which have appeared in various magazines and newspapers throughout the country continuously from 1904 until August, 1920.

He was extremely modest, loving simplicity and hating ostentation. His great ability and worth would no doubt have been more widely known and appreciated had he been more of a selfseeker. He was greatly admired and loved by his students, particularly by graduate students. Those who knew him best loved him most.

SAMUEL G. BARTON

#### SCIENTIFIC EVENTS

##### AGRICULTURAL WORK OF THE NATIONAL RESEARCH COUNCIL

WITH the advice and assistance of the National Research Council a cooperating group of scientific investigators of insect pests and plant diseases together with representatives of leading industrial concerns engaged in the manufacture of chemicals and appliances used in fighting these enemies of crops has been organized under the name of the Crop Protection Institute. This institute will undertake and support a series of thorough scientific studies of the crop pests themselves and of the means of improving and standardizing the materials and appliances used in fighting them. The Board of Trustees of the institute is composed of nine scientific men representing leading scientific organizations interested in crop protection and four representatives of the manufacturing and commercial interests. The temporary secretary is Mr. Harrison E. Howe, chairman of the Division of Research Extension of the National Research Council.